

**IN THE CLAIMS**

The status of the claims is as follows.

*D* 3 1. (Currently amended) A method for making a pattern of a metal containing material on a substrate, said method comprising:

(a) applying a mesomorphous film of a metal complex on a surface of the substrate;

(b) exposing, in a first atmosphere, a first area, having a first shape, of said film to electromagnetic radiation from a first source to cause said metal complex in said first area to undergo a first photo-chemical reaction, said first photochemical reaction transforming said metal complex in said first area into a first metal containing material adherent to said substrate and one or more ligand byproducts of a first kind at least some proportion of which are driven off during the course of said first photochemical reaction, wherein the pattern comprises said first shape; and optionally

(c) driving off an unreacted amount of said metal complex and a remainder of said one or more ligand byproducts of a first kind that are not driven off during the course of said first photochemical reaction.

2. (Currently amended) The method of claim 1 further comprising:  
after said applying,

(d) exposing, in a second atmosphere, a second area, having a second shape, of said film to electromagnetic radiation from a second source to cause said metal complex in said second area to undergo a second photo-chemical reaction, said second photochemical reaction transforming said metal complex in said second area into a second metal containing material adherent to said substrate and one or more ligand byproducts of a second kind at least some proportion of which are driven off during the course of said second photochemical reaction, wherein the pattern additionally comprises said second shape; and

(e) driving off an unreacted amount of said metal complex and a remainder of said one or more ligand byproducts of a second kind that are not driven off during the course of said second photochemical reaction.

3. (Original) The method of claim 2 wherein said first area is adjacent to said second area and said first and second metal containing materials form a planar structure on said substrate.

4. (Currently amended) The method of claim 2 wherein said steps of exposing said first and second areas of said film to electromagnetic radiation from said first and second sources respectively, comprise aligning first and second masks over said substrate and illuminating a surface surfaces of said first mask ~~masks~~ away from said substrate with said electromagnetic radiation from a first source, and illuminating a surface of said second mask away from said substrate with said electromagnetic radiation from a second source.

5. (Currently amended) The method of claim 4 2 wherein at least one of said electromagnetic radiation from a first source, and said electromagnetic radiation from a second source comprises ultraviolet light.

6. (Original) The method of claim 2 wherein said first atmosphere comprises oxygen and said first metal containing material is a metal oxide.

7. (Original) The method of claim 1 wherein said first atmosphere comprises oxygen and said first metal containing material is a metal oxide.

8. (Original) The method of claim 7 wherein said first atmosphere is air.

9. (Currently amended) The method of claim 7 further comprising: removing remaining metal complex from said substrate, after said exposing said first area of said film to said electromagnetic radiation from said a first source.

10. (Original) The method of claim 7 further comprising the step of reacting said metal oxide with a suitable chemical in a suitable atmosphere to reduce said metal oxide to a metal adherent to said substrate.

11. (Currently amended) The method of claim 1 wherein a local temperature of said first metal containing material is maintained below an annealing temperature of said first metal containing material throughout said step of exposing said first area of said film to electromagnetic radiation from said a first source.

12. (Original) The method of claim 11 wherein said local temperature is maintained below 320 °C.

13. (Currently amended) The method of claim 1 wherein said exposing said first area of said film to electromagnetic radiation comprises aligning a first mask over said substrate and illuminating a surface of said mask away from said substrate with said electromagnetic radiation from said a first source.

14. (Currently amended) The method of claim 13 wherein said electromagnetic radiation from a first source comprises ultraviolet light.

15. (Currently amended) The method of claim 1 wherein said metal complex comprises one or more metal atoms bonded to one or more ligands, at least one of said one or more ligands is bonded to said metal complex by a chemical bond which is broken by the absorption of said electromagnetic radiation from a first source, and wherein said complex is unstable when said at least one ligand is removed.

16. (Original) The method of claim 15 wherein said at least one ligand comprises a carboxylate group.

17. (Original) The method of claim 15 wherein at least one of said ligands is selected from the group consisting of: oxalato; halogens; hydrogen; hydroxy; cyano; carbonyl, nitro; nitrito; nitrate; nitrosyl; ethylene; acetylenes; thiocyanato; isothiocyanato; aquo; azides; carbonato; amine; pyridinyl; and thiocarbonyl.

18. (Currently amended) The method of claim 15 wherein at least one of said ligands is selected from the group consisting of: alkoxy; alkyl; alkenyl; alkynyl; alicyclic; substituted alicyclic; alkyl bicyclic, ~~such as norbornyl~~; phenyl; substituted phenyl; naphthyl, naphthylene; phenoxy; substituted phenoxy; carboxylate; substituted carboxylate; benzoate; substituted benzoate; and heterocyclic aromatic.

Claims 19-43 (Cancelled).

44. (Previously reinstated -- formerly claim 19) The method of claim 18 wherein any of said ligands that comprises one or more aryl groups does not comprise more than 26 carbon atoms.

45. (Previously reinstated -- formerly claim 20) The method of claim 18 wherein any of said ligands that does not comprise any aryl groups does not comprise more than 12 carbon atoms.

46. (Previously reinstated -- formerly claim 21) The method of claim 45 wherein said at least one ligand has formula O<sub>2</sub>CR wherein R is an organic group selected from the group consisting of alkyl, alkene and alkyne.

47. (Previously reinstated -- formerly claim 22) The method of claim 46 wherein R is (CH<sub>2</sub>)<sub>4</sub>CH<sub>3</sub>.

48. (Previously reinstated -- formerly claim 27) The method of claim 17 wherein at least one of said ligands is a bidentate ligand selected from the group consisting of:  $\beta$ -diketonato, mono-thio- $\beta$ -diketonato, dithiolene, salicyladehyde, benzalazine, ethane-1,2-dithiolato, ethane-1,2,-dioximate, and dithiocarboxylate.

49. (Previously reinstated -- formerly claim 23) The method of claim 17 wherein at least one of said ligands comprises one or more linking moieties, selected from the group consisting of: azo, diazo, oxy, amino, vinylene, phenylene, substituted phenylene, oxime, carboxy, and imine.

50. (Previously reinstated -- formerly claim 28) The method of claim 1 wherein said metal complex comprises two metal atoms bonded to one another.

51. (Previously reinstated -- formerly claim 24) The method of claim 15 wherein at least one of said metal atoms is selected from the group consisting of: copper, nickel, platinum, palladium, ruthenium, rhenium, molybdenum, chromium, tungsten and iron.

52. (Previously reinstated -- formerly claim 25) The method of claim 15 wherein at least one of said metal atoms is selected from the group consisting of: lead, mercury, tin, silicon and germanium.

53. (Previously reinstated -- formerly claim 26) The method of claim 15 wherein at least one of said metal atoms is selected from the group consisting of: rhenium and ruthenium.

54. (Currently amended) The method of claim 15 wherein said absorption of said electromagnetic radiation from a first source places said metal complex in a ligand to metal charge transfer excited state in which a metal to ligand bond in said metal complex is unstable.

55. (Currently amended) The method of claim 15 wherein said absorption of said electromagnetic radiation from a first source places said metal complex in a metal to ligand charge transfer excited state in which a metal to ligand bond in said metal complex is unstable.

56. (Currently amended) The method of claim 15 wherein said absorption of said electromagnetic radiation from a first source places said metal complex in a d-d excited state such that a metal to ligand bond in said complex is unstable.

57. (Currently amended) The method of claim 15 wherein said absorption of said electromagnetic radiation from a first source places said metal complex in an intramolecular charge transfer excited state such that a metal to ligand bond in said complex is unstable.

58. (Currently amended) The method of claim 15 wherein said absorption of said electromagnetic radiation from a first source places at least one of said ligands in a localized ligand excited state wherein a bond between said excited ligand and said metal complex is unstable.

59. (Currently amended) The method of claim 1 wherein said exposing of said film to said electromagnetic radiation from a first source places said metal complex in an

intramolecular charge transfer excited state such that at least one of said at least one ligands is unstable and decomposes.

60. (Currently amended) The method of claim 1 wherein said exposing of said film to said electromagnetic radiation from a first source places at least one of said ligands in a localized ligand excited state wherein said excited ligand is unstable and decomposes.

61. (Currently amended) The method of claim 1 wherein said exposing of said film to said electromagnetic radiation from a first source places said metal complex in a metal to ligand charge transfer excited state such that at least one of said at least one ligands is unstable and decomposes.

62. (Currently amended) The method of claim 1 wherein said exposing of said film to said electromagnetic radiation from a first source places said metal complex in a ligand to metal charge transfer excited state such that at least one of said at least one ligands is unstable and decomposes.

63. (Previously reinstated and previously amended -- formerly claim 41) The method of claim 1 additionally comprising repeating said applying, said exposing and said driving off for a second metal complex.

64. (Previously reinstated -- formerly claim 42) The method of claim 63 wherein said second metal complex is applied on top of said first metal containing material.

65. (Previously reinstated -- formerly claim 43) The method of claim 63 wherein said second metal complex is applied directly to said substrate.

66. (Previously reinstated and previously amended -- formerly claim 38) A method for making patterned metal containing material on a substrate, said method comprising:

(a) applying a mesomorphous film of a metal complex on a surface of the substrate;  
(b) exposing, in a first atmosphere, a first area, having a first shape, of said film to a particle beam to cause said metal complex in said first area to undergo a transformation into a first metal-containing material adherent to said substrate and one or more ligand byproducts

of a first kind at least some proportion of which are driven off during the course of said transformation;

(c) optionally driving off an unreacted amount of said metal complex and a remainder of said one or more ligand byproducts of a first kind that are not driven off during the course of said transformation;

(d) exposing, in a second atmosphere, a second area of said film, having a second shape, adjacent to said first area, to electromagnetic radiation of a wavelength suitable to cause said metal complex in said second area to undergo a photo-chemical reaction, said reaction transforming said metal complex in said second area into a second metal containing material adherent to said substrate and one or more ligand byproducts of a second kind at least some proportion of which are driven off during the course of said photochemical reaction; and optionally

(e) driving off an unreacted amount of said metal complex and a remainder of said one or more ligand byproducts of a second kind that are not driven off during the course of said photochemical reaction.

67. (Previously reinstated -- formerly claim 39) The method of claim 66 wherein said particle beam is selected from a group consisting of an electron beam and an ion beam.

68. (Previously reinstated -- formerly claim 40) A thin mesomorphous film on a substrate, wherein the film comprises a photoreactive precursor metal complex.